It is respectfully submitted that the claims of the present invention are non-obvious and patentable over the claims of the cited patent and co-pending application. The present application describes and claims MAC to PHY and MAC to MAC interface implementations having recite transmit and receive control lines/signals. Patent No. 5,953,345 and application No. 09/088,956 describe and claim MAC to PHY and MAC to MAC interface implementations with 2n+2 wires (where n is the number of ports), but without recite transmit and receive control lines/signals. Accordingly, it is respectfully submitted that the inventions described and claimed in the respective applications and patent are patentably distinct. Withdrawal of the obviousness-type double patenting rejections is respectfully requested.

Claim Rejections

Claim 8 stands rejected under 35 U.S.C. §112, second paragraph, as indefinite. This rejection is traversed. The "4 bit segment" recited in claim 8, lines 2-3 refers to a 4 bit segment on the transmit data line, rather than in transmit control signal, as recited in claim 7. Determination of the beginning of the 4 bit segment of the transmit data line is determined by the synchronization bit of the transmit control signal. Therefore, the indefinite article is used. It is respectfully submitted that the claim is sufficiently clear as written and withdrawal of the rejection is respectfully requested.

Claim 16 stands rejected under 35 U.S.C. §102(e) as being anticipated by Runaldue et al. (U.S. Patent No. 6,108,726). The rejection is respectfully traversed for at least the following reasons.

The Office Action states that Runaldue discloses a MAC to PHY interface including "time-division multiplexed data and control, *i.e. clock* [emphasis added], lines for receive and transmit...." Runaldue discloses a MAC to PHY interface having seven pins (wires): CLOCK, TXDATA, TXEN, COL, CRS, RXDATA, and RXDATAVALID, as shown in Fig. 3 and described at column 3, line 36 - column 4, line 3, for every four GPSI connections (ports). Six of the seven wires in the Runaldue interface are defined as "multiplexed inputs." As shown in FIG. 5, each wire of Runaldue has a fixed function, which is used for a set of four ports or "channels." Stated another way, each of Runaldue's wires conveys a signal having the same definition (one of the seven defined in the specification as noted above) to a group of different ports (in this case, a group of four ports) regardless of the time slot. Thus, Runaldue's system relates to "multiplexing by ports." Of the seven pins of the Runaldue interface, the CLOCK pin is not defined as a "multiplexed input," but instead simply an input synchronous with TXDATA and RXDATA.

The present invention relates to an interface in which the time-division multiplexing is not done on the basis of ports, as in Runaldue, but instead on the basis of function, thus

"multiplexing by functions." Instead of pins with a fixed function time-division multiplexed into multiple time slots conveying multiple signals of a given function, the present invention utilizes time-division multiplexing in which each time slot functions differently. In other words, according to the present invention, each pin (wire) has a set of different definitions depending on the time slot.

Claims 16 recites a MAC to PHY interface having time-division multiplexed transmit and receive data and control lines. The Office Action asserts that the time-division multiplexed receive control and receive data line recitations in claim 16 are met by the disclosure of the CLOCK line in Runaldue. It is respectfully submitted that the CLOCK line of Runaldue is not a control line. Claim 16 recite as a separate element, "a common clock," making it clear that the control lines are not clock lines. Moreover, as noted above, of the seven pins of the Runaldue interface, the CLOCK pin is not defined as a "multiplexed input," but instead simply an input synchronous with TXDATA and RXDATA. Thus, it is respectfully submitted that the CLOCK pin of the Runaldue interface does not satisfy the time-division multiplexed control line limitations of claim 16, and that, therefore, Runaldue does not anticipate claim 16. To further illustrate this point, new claims 17 and 18 have been added to recite the definitions of the signals time-division multiplexed on a receive control line and transmit control line, respectively, in accordance with embodiments of the present invention. Accordingly withdrawal of the rejection under 35 U.S.C. § 102 is respectfully requested.

Claims 1-15 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Runaldue et al. (U.S. Patent No. 6,108,726) as applied to claim 16 and further in view of Chow et al. (U.S. Patent No. 6,169,742). The rejection is respectfully traversed for at least the following reasons.

As noted above, Runaldue provides a different approach to a MAC to PHY interface that makes use of multiplexing by port rather than multiplexing by function. The Runaldue interface technique does not disclose sending time-division multiplexed receive control or transmit control signals. Chow relates to a network switch having a management port for direct communication with an external management agent in which PHYs are replaced by a logic interface. Nothing in Chow cures the noted deficiencies in Runaldue with respect to the present invention. The combination of these references provides no teaching of a MAC to PHY or MAC to MAC interface having time-division multiplexed receive control or transmit control signals.

For at least the above reasons, Applicants respectfully submit that claims 1-15 are patentable over Runaldue in view of Chow, and withdrawal of the rejection under 35 U.S.C. § 103 is respectfully requested.

Revocation and New Power of Attorney

A Revocation of Prior Powers of Attorney and Grant of New Power of Attorney and updated address for correspondence was filed in this application on November 29, 2001 (after the mailing of the current Office Action). Please address further communications in this application to the new address provided therein:

Customer Number 022434
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Conclusion

A clean version of any amended specification sections or claims with instructions for entry pursuant to 37 C.F.R. §1.121 is included above. A marked-up version of any amended specification paragraphs or claims pursuant to 37 C.F.R. §1.121 is attached as an Appendix.

Applicants believe that all pending claims are allowable and respectfully request a Notice of Allowance for this application from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the telephone number set out below. If any additional fees are due in connection with the filing of this amendment, the Commissioner is authorized to charge such fees to Deposit Account 500388 (Order No. CISCP035).

Respectfully submitted,
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APPENDIX

MARKED-UP COPIES OF AMENDED SPECIFICATION AND CLAIMS

The Abstract paragraph on page 21 has been amended as follows:

A system and method are disclosed for providing a method of communicating between a media access control (MAC) layer and a physical (PHY) layer. The method includes sending a 100 MHz time-division multiplexed signal on a receive data line and sending a time-division multiplexed receive control signal on a receive control line. A 100 MHz time-division multiplexed signal is sent on a transmit data line and a time-division multiplexed transmit control signal is sent on a transmit control line.

The paragraph under the heading "CROSS-REFERENCE TO RELATED APPLICATIONS" on page 1 has been amended as follows:

This application is related to co-pending U.S. Patent Application No. 09/089,033 filed on June 2, 1998, now U.S. Patent No. 5,953,345, entitled "Reduced Pin-Count 10Base-T MAC to Transceiver Interface" and co-pending U.S. Patent Application No. 09/088,956 filed on June 2, 1998 entitled "Serial Media Independent Interface" [(Attorney Docket Nos. CISCP032 and CISCP053, respectively) filed concurrently herewith,] which are incorporated herein by reference for all purposes.

Claims 1-16 have been amended as follows:

1. (amended) A method of communicating between a media access control layer and a physical layer, [MAC and a PHY] comprising:

sending a 100 MHz time-division multiplexed signal on a receive data line ;

sending a time-division multiplexed receive control signal on a receive control line;

sending a 100 MHz time-division multiplexed signal on a transmit data line;

sending a time-division multiplexed transmit control signal on a transmit control line.

2. (amended) The method of [A method of communicating between a MAC and a PHY as recited in] claim 1 wherein the time-division multiplexed receive control signal includes 4 bit segments and wherein each 4 bit segment includes a synchronization bit.

3. (amended) The method of [A method of communicating between a MAC and a PHY as recited in] claim 2 wherein the receive data line includes 4 bit segments and wherein the beginning of a 4 bit segment is determined by the synchronization bit.

4. (amended) The method of [A method of communicating between a MAC and a PHY as recited in] claim 1 wherein the time-division multiplexed receive control signal includes 4 bit segments and wherein each 4 bit segment includes a receive data valid bit.

5. (amended) The method of [A method of communicating between a MAC and a PHY as recited in] claim 1 wherein the time-division multiplexed receive control signal includes 4 bit segments and wherein each 4 bit segment includes a receive error bit.

6. (amended) The method of [A method of communicating between a MAC and a PHY as recited in] claim 1 wherein the time-division multiplexed receive control signal includes 4 bit segments and wherein each 4 bit segment includes a carrier sense bit.

7. (amended) The method of [A method of communicating between a MAC and a PHY as recited in] claim 1 wherein the time-division multiplexed transmit control signal includes 4 bit segments and wherein each 4 bit segment includes a synchronization bit.

8. (amended) The method of [A method of communicating between a MAC and a PHY as recited in] claim 7 wherein the transmit data line includes 4 bit segments and wherein the beginning of a 4 bit segment is determined by the synchronization bit.

9. (amended) The method of [A method of communicating between a MAC and a PHY as recited in] claim 1 wherein the time-division multiplexed transmit control signal includes 4 bit segments and wherein each 4 bit segment includes a transmit enable bit.

10. (amended) The method of [A method of communicating between a MAC and a PHY as recited in] claim 1 wherein the time-division multiplexed transmit control signal includes 4 bit segments and wherein each 4 bit segment includes a transmit error bit.

11. (amended) The method of [A method of communicating between a MAC and a PHY as recited in] claim 1 further including indicating the speed of the PHY using the receive data line.

12. (amended) The method of [A method of communicating between a MAC and a PHY as recited in] claim 11 wherein indicating the speed of the PHY using the receive data line includes including an interface speed bit in a data segment when a receive control segment indicates no carrier sense, no receive data valid and no receive error.

13. (amended) The method of [A method of communicating between a MAC and a PHY as recited in] claim 1 further including buffering data transmitted from the PHY to the MAC using an elasticity buffer that is at least 27 bits long.

14. (amended) The method of [A method of communicating between a MAC and a PHY as recited in] claim 1 further including buffering data transmitted from the PHY to the MAC using an elasticity buffer that long enough to buffer an entire frame of data from a data source having a clock with a frequency tolerance of 0.1%.

15. (amended) An interface between a first media access control layer [MAC] and a second media access control layer, [MAC] consisting essentially of:

a time-division multiplexed receive data line;

a time-division multiplexed receive control line;

a time-division multiplexed transmit data line;

a time-division multiplexed transmit control line.

16. (amended) A media access control layer to physical layer [MAC to PHY] interface consisting essentially of:

a common clock;

a time-division multiplexed receive data line;

a time-division multiplexed receive control line;

a time-division multiplexed transmit data line;

a time-division multiplexed transmit control line.

17. (new) The interface of claim 16, wherein said time-division multiplexed receive control line contains signals comprising a receive date valid signal, a receive error signal and a carrier sense signal.

18. (new) The interface of claim 16, wherein said time-division multiplexed transmit control line contains signals comprising a transmit enable signal and a transmit error signal.